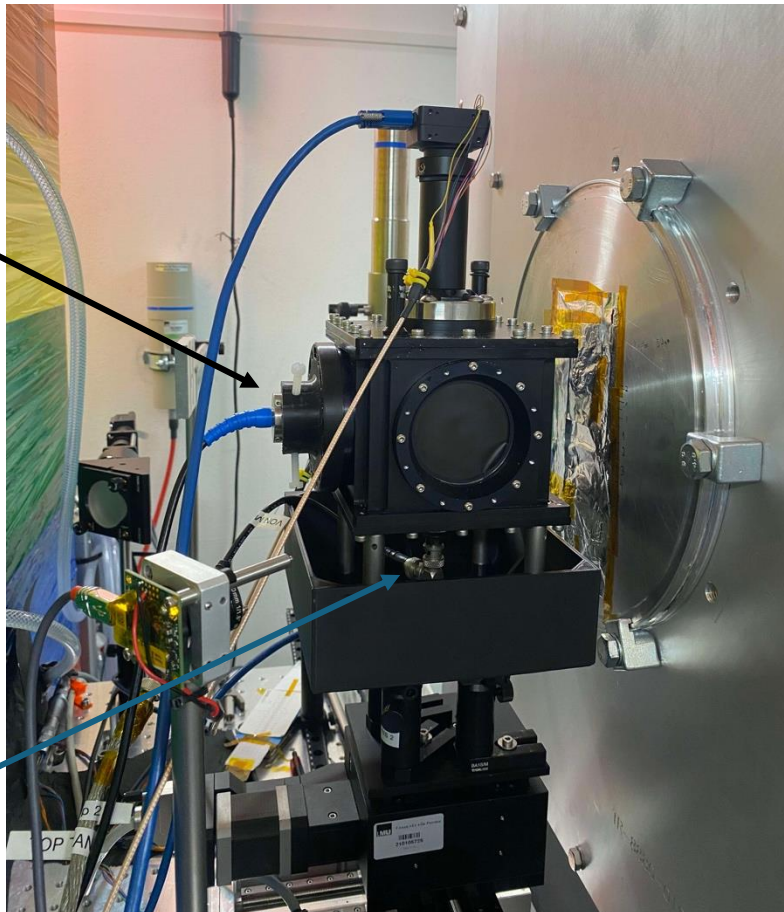


LION Beamline Experiment Data Analysis

10/2/2025

Day 2 & 3: Liquid Scintillator & Transducers

**Piston
hydrophone
+ voltage amplifier**



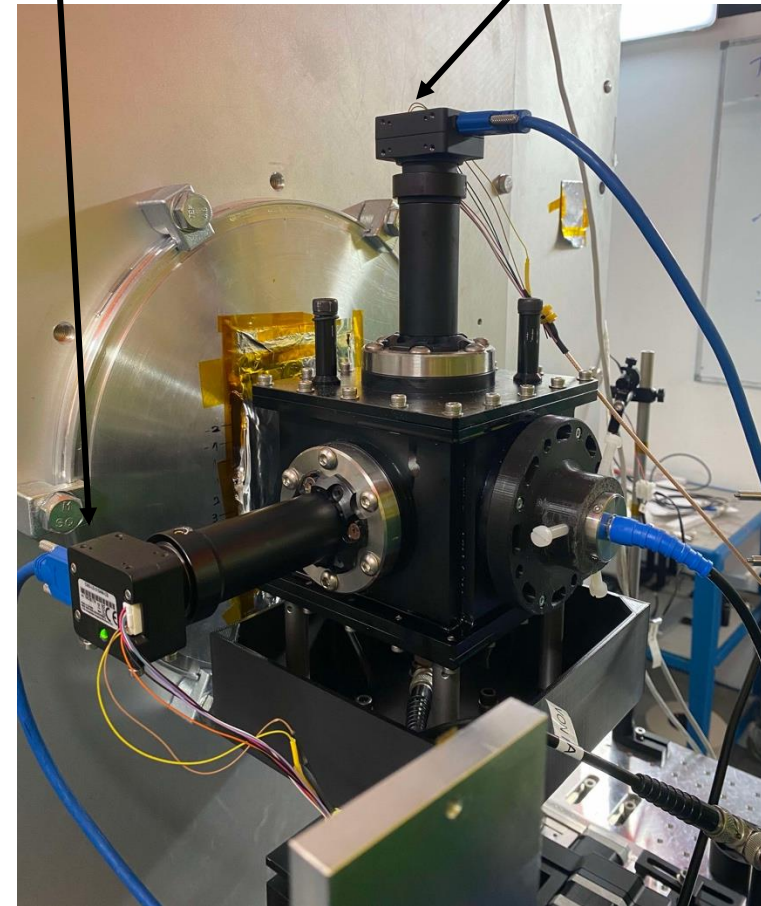
**Olympus
hydrophone
+ charge amplifier**

Camera 1

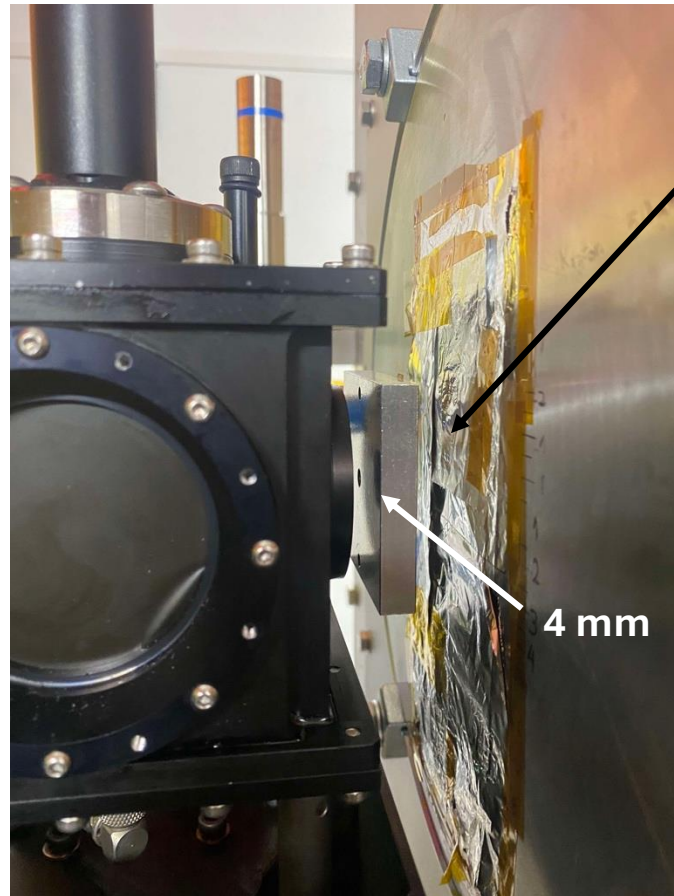
x2x5 filter

Camera 2

x10 filter

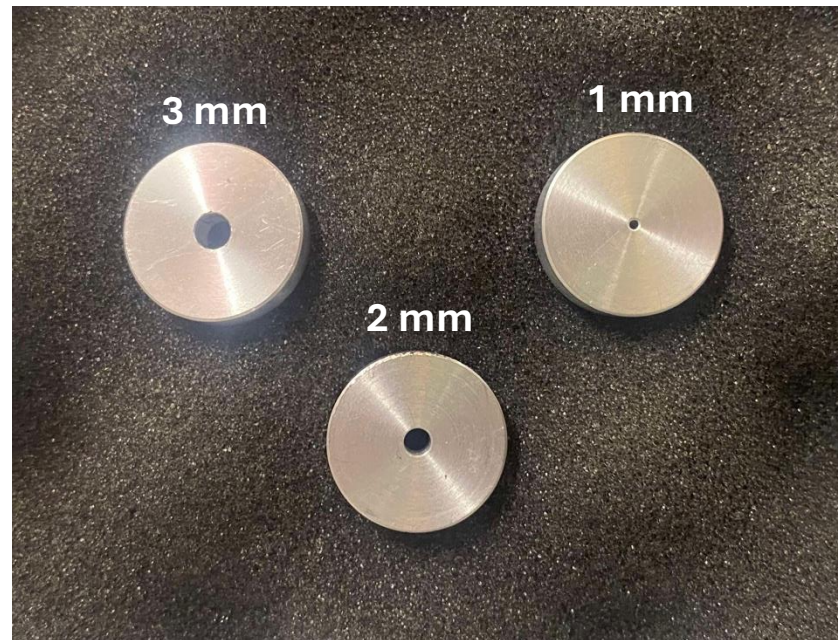


Day 2 & 3: Liquid Scintillator & Transducers Collimators



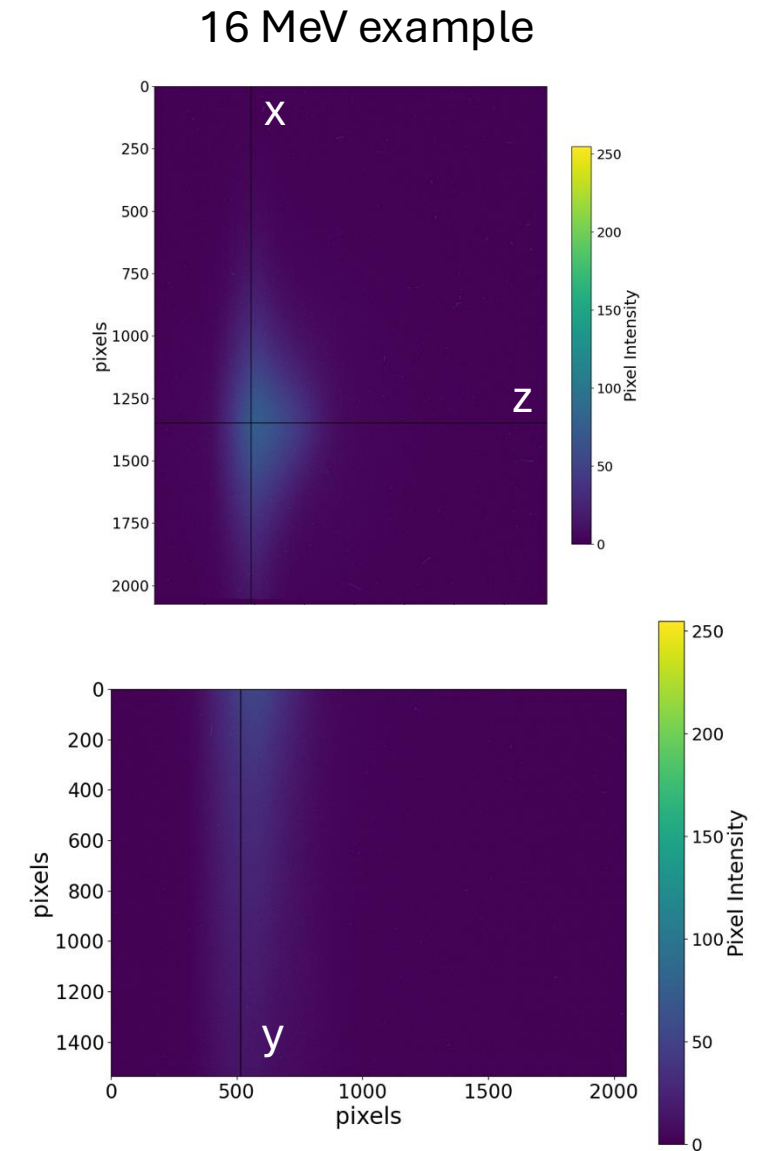
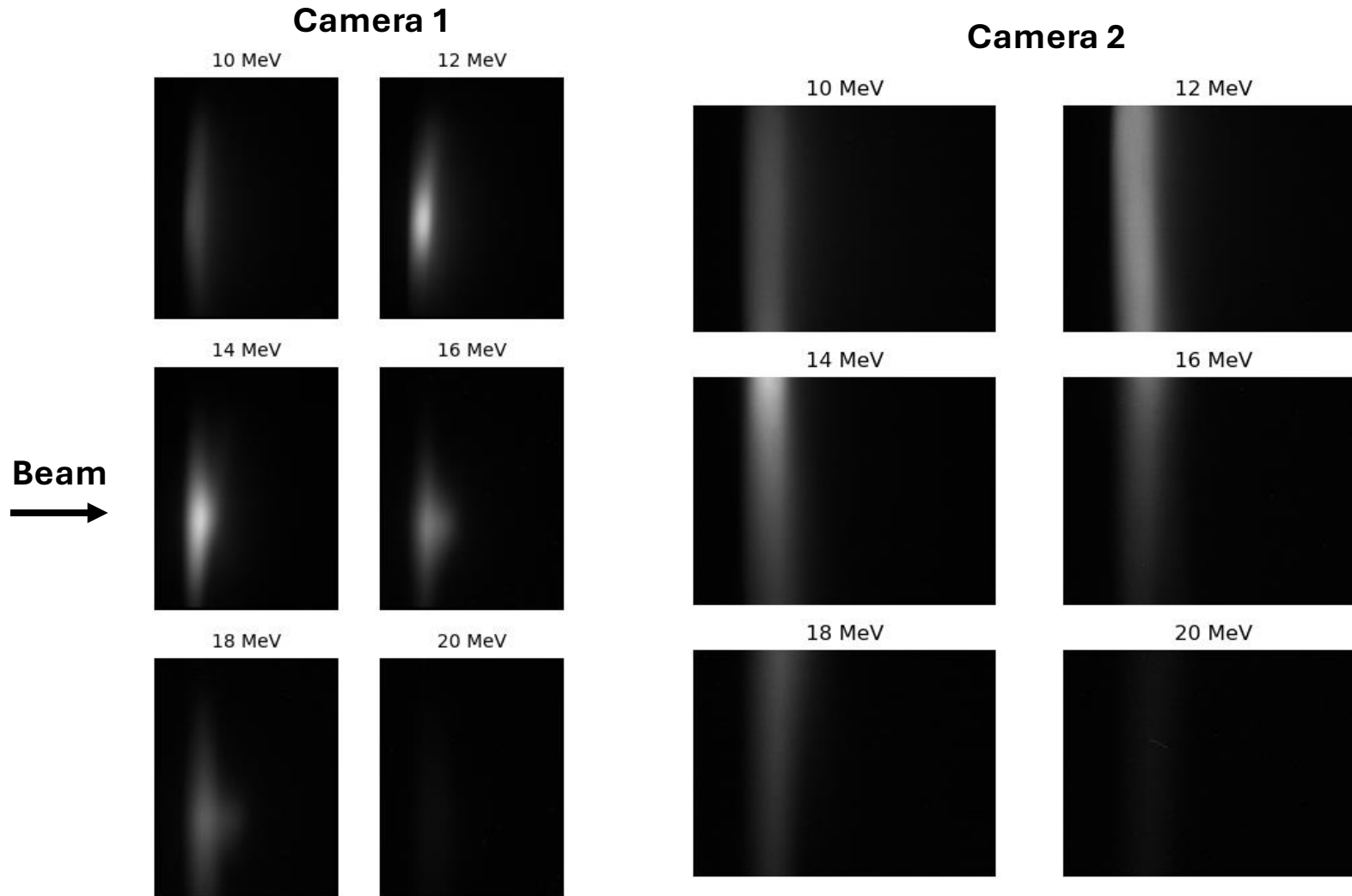
Exit Window

Collimators



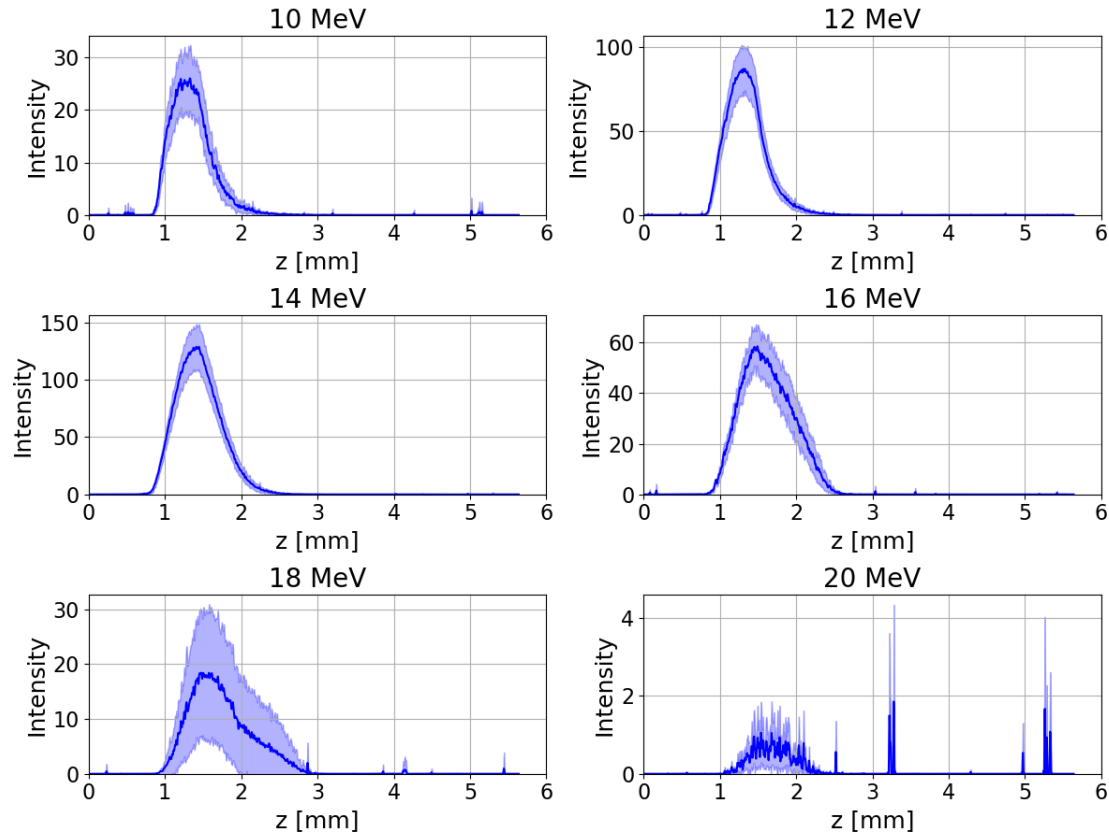
Day 2 & 3: Liquid Scintillator

Example image: No collimator

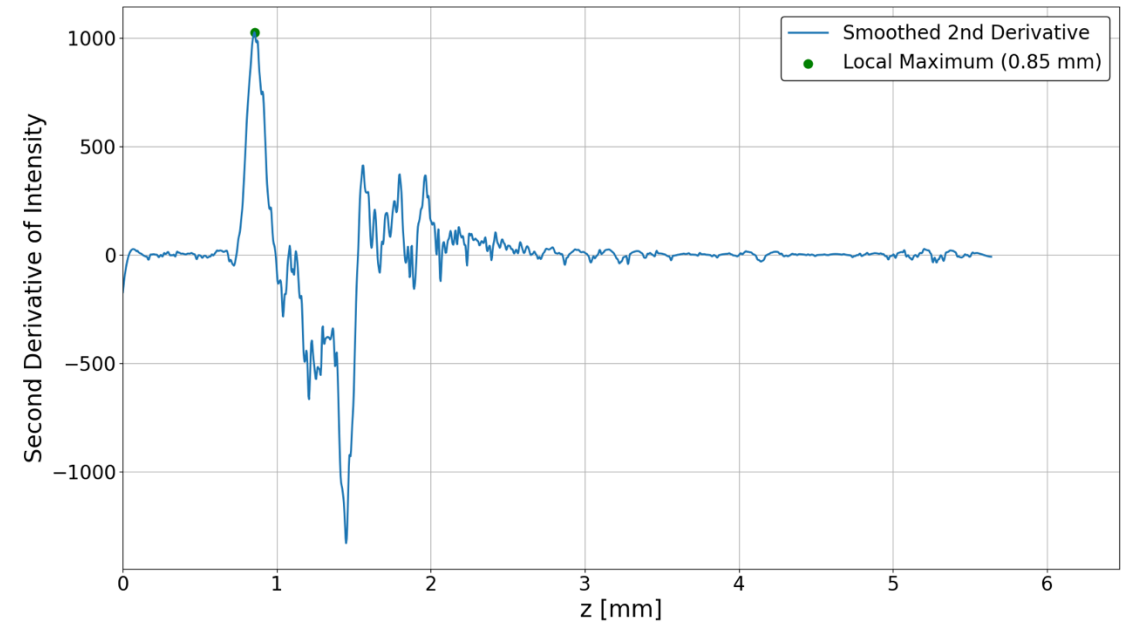


Day 2 & 3: Liquid Scintillator Energy Scan **No Collimator**

z-axis

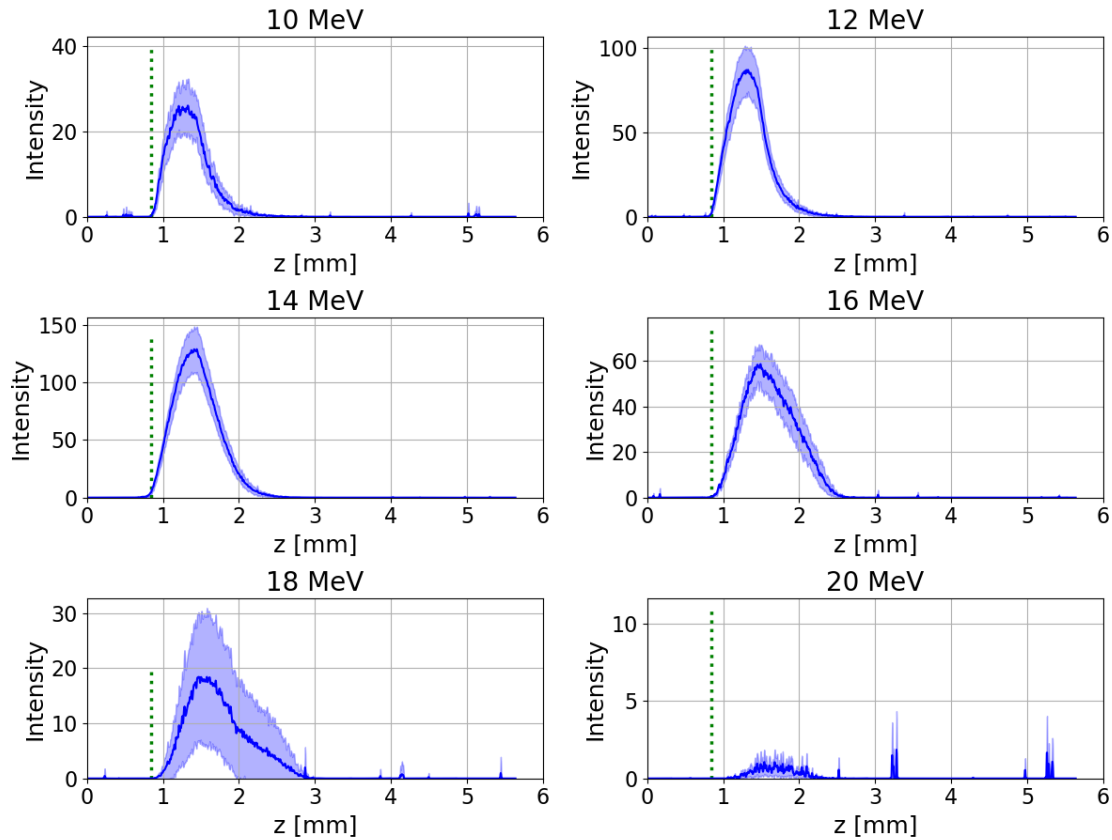


Average over 60 pixels



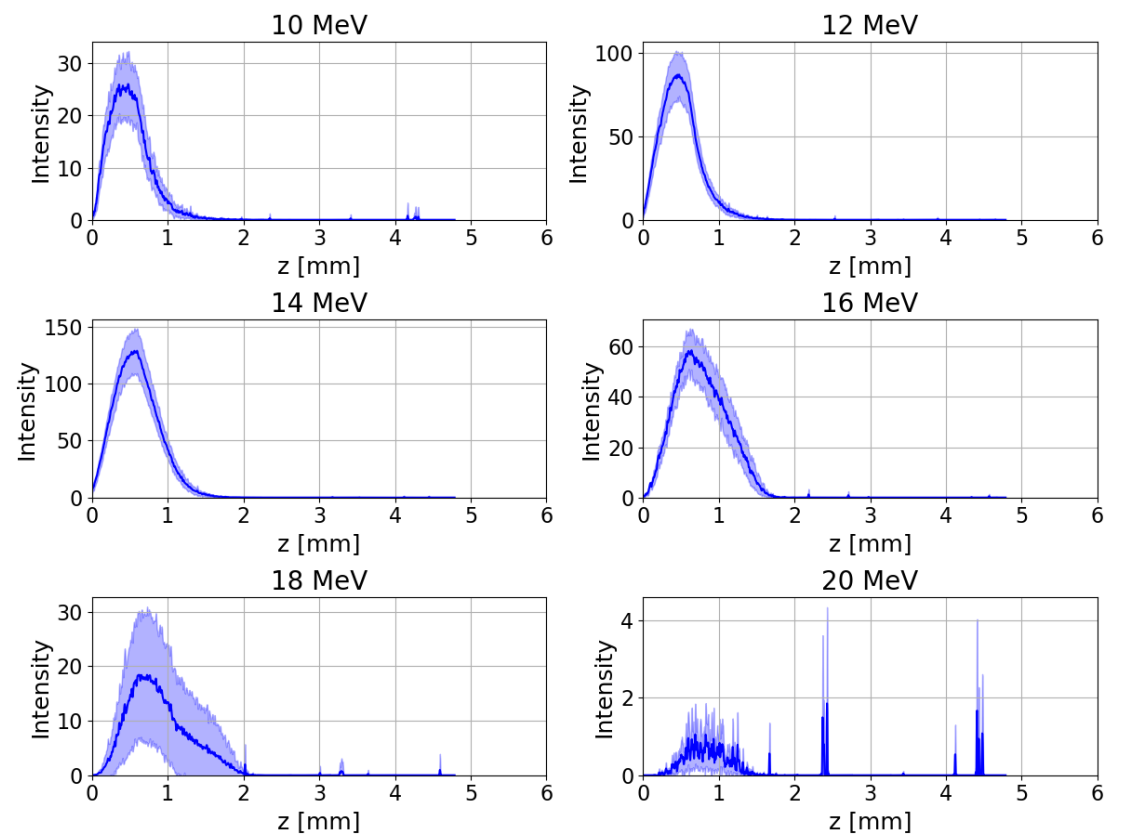
Day 2 & 3: Liquid Scintillator Energy Scan **No Collimator**

z-axis



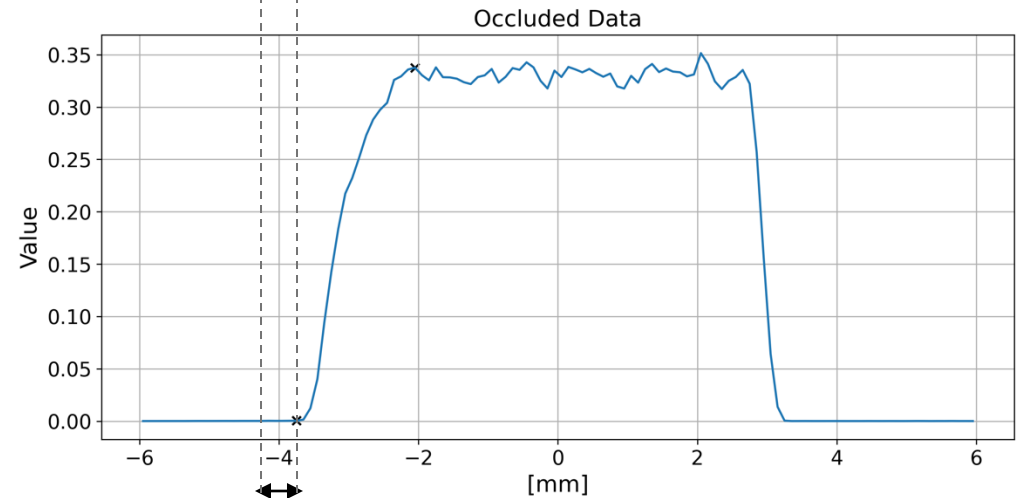
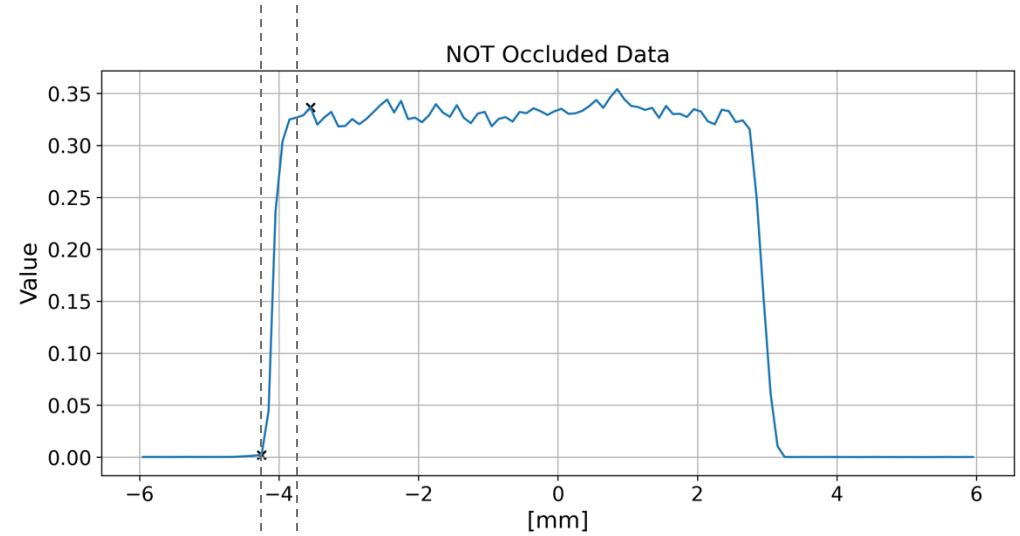
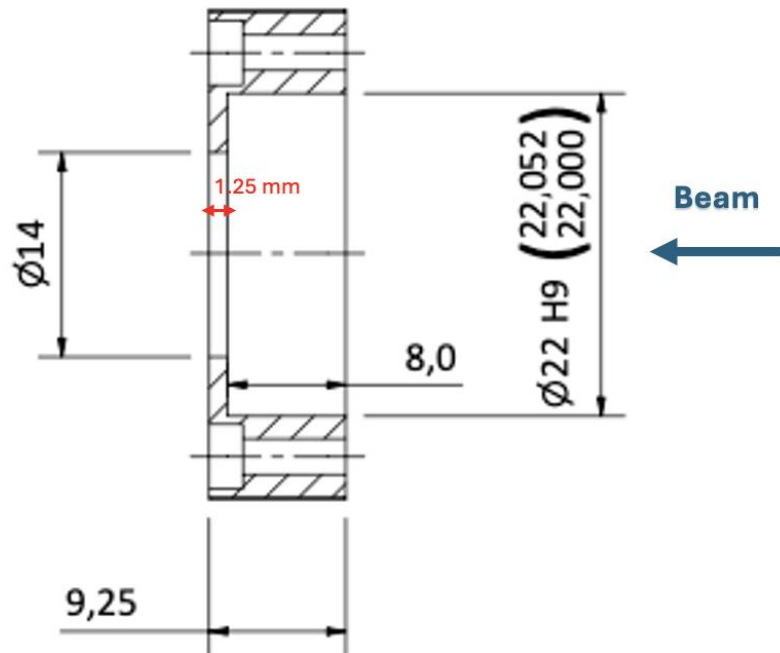
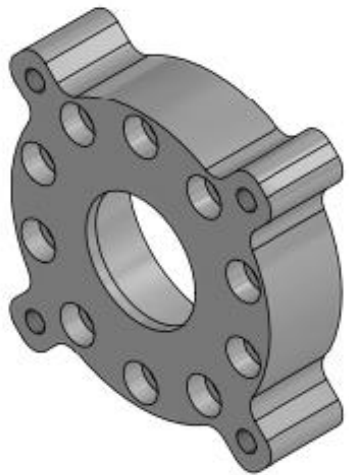
Average over 60 pixels

z-axis - cropped



Average over 60 pixels

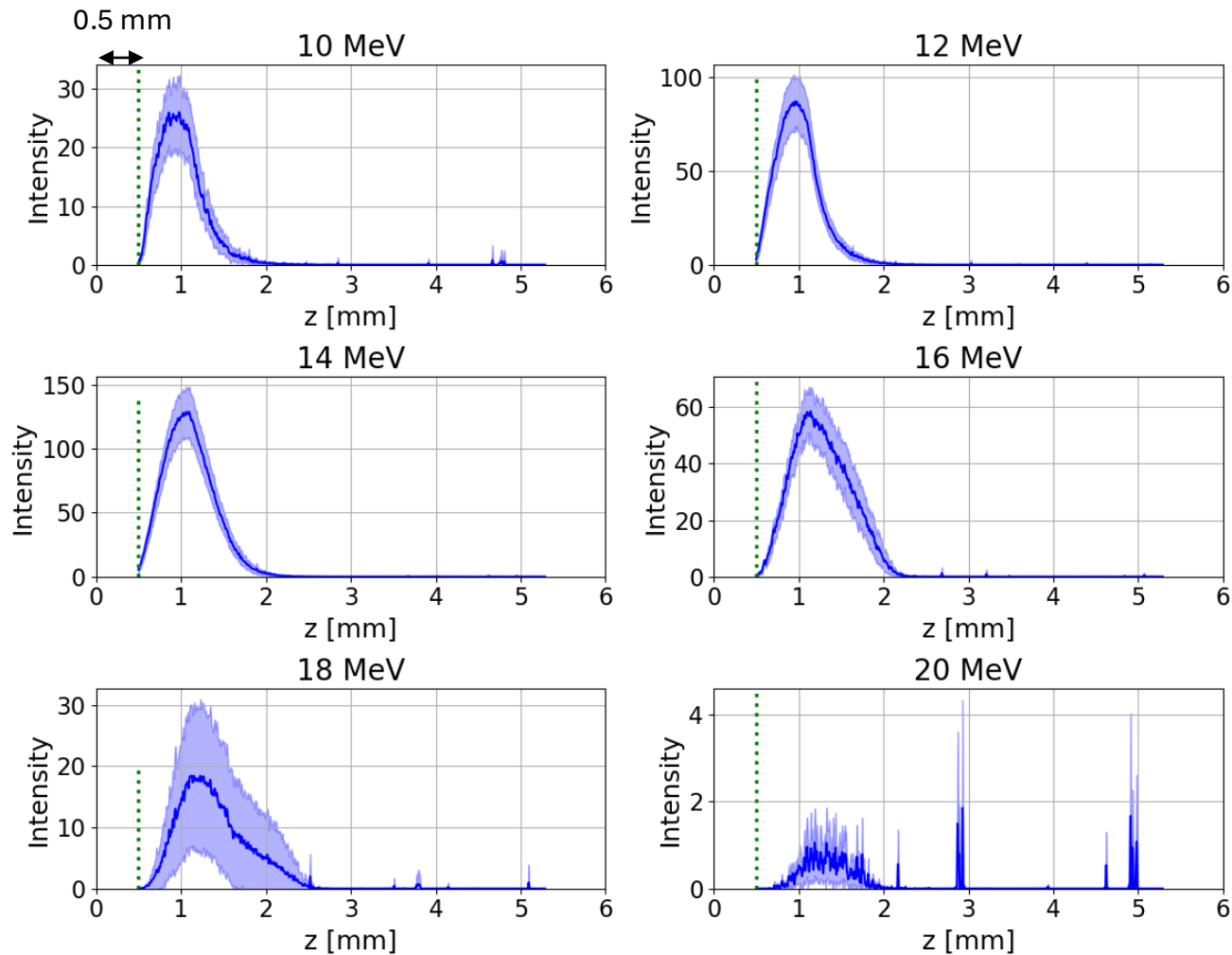
Day 2 & 3: Liquid Scintillator Entrance Window



0.5 mm

Day 2 & 3: Liquid Scintillator

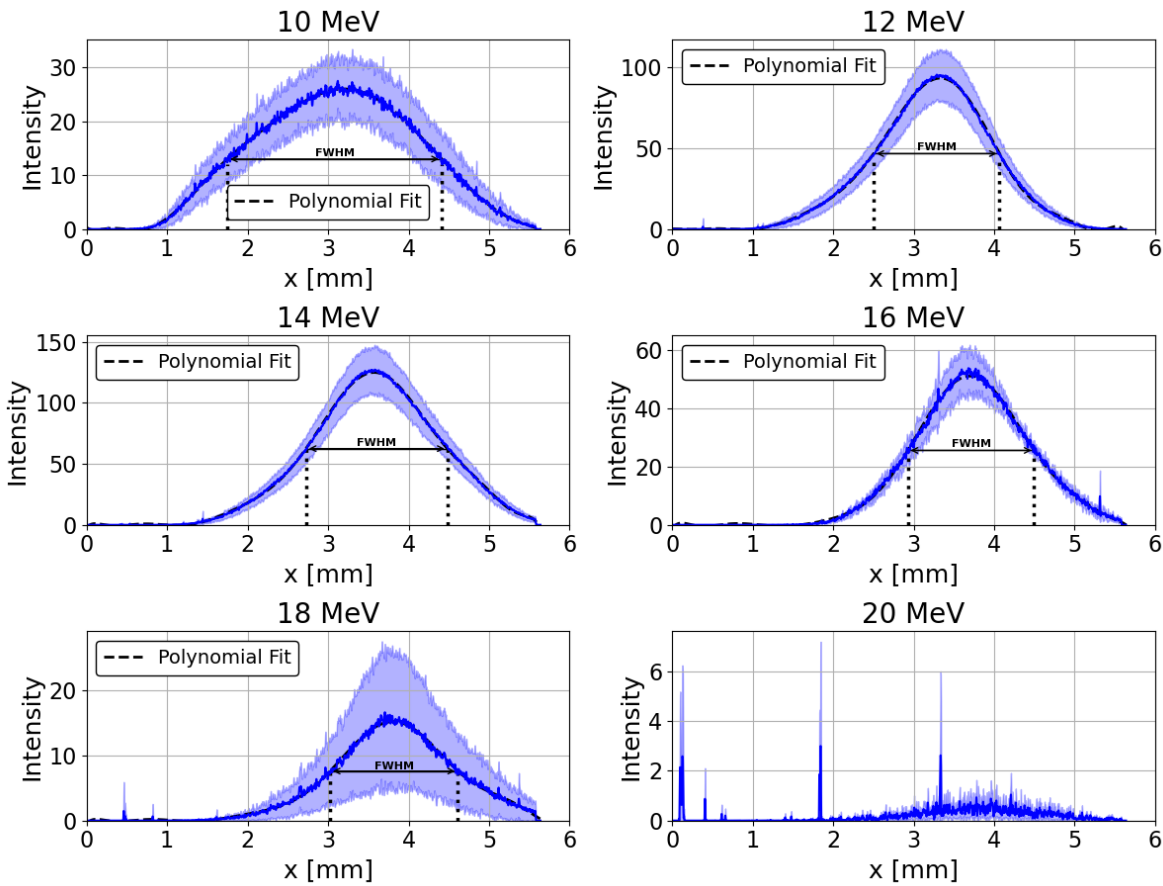
Energy Scan **No Collimator**



Day 2 & 3: Liquid Scintillator Energy Scan

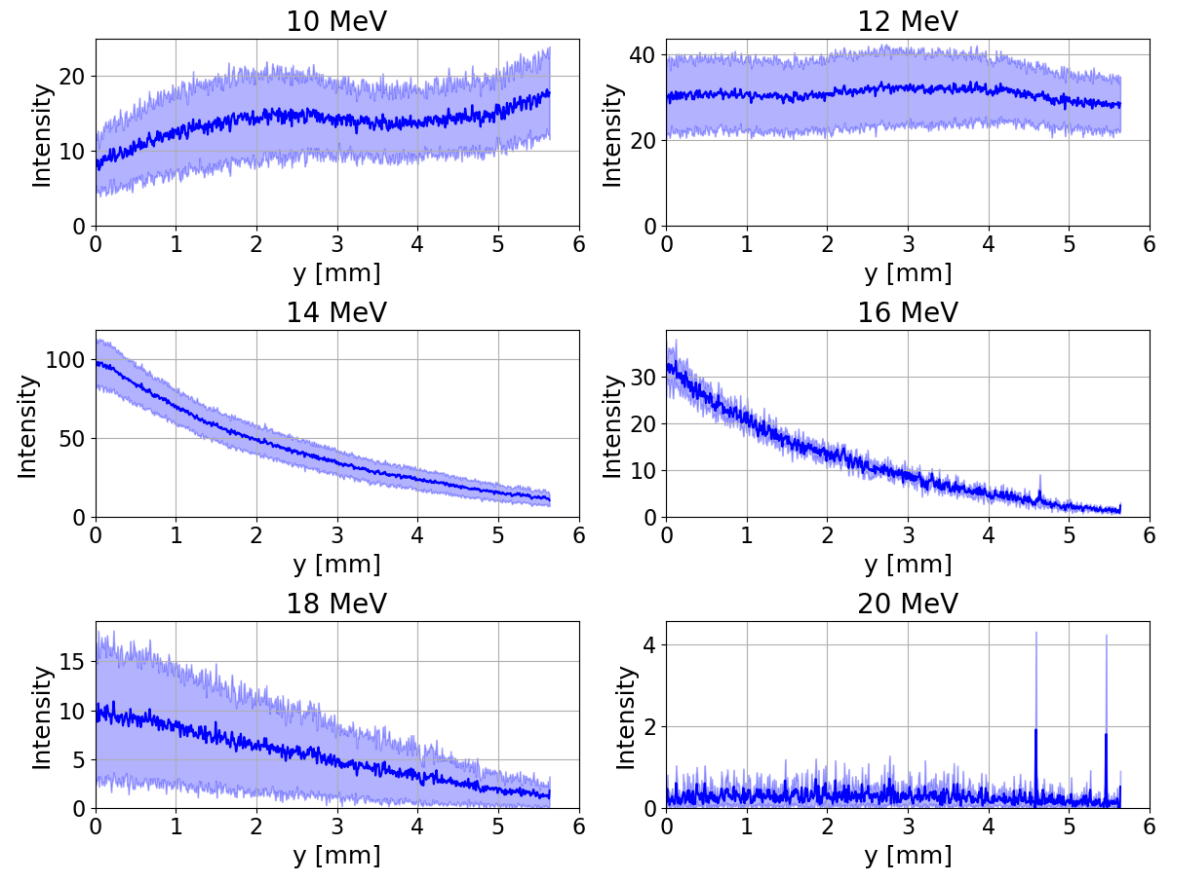
No Collimator

x-axis



Average over 60 pixels

y-axis



Average over 60 pixels

Day 2 & 3: Liquid Scintillator

Example image: 4 mm collimator

Camera 1

Camera 2

10 MeV

12 MeV

10 MeV

12 MeV

14 MeV

16 MeV

14 MeV

16 MeV

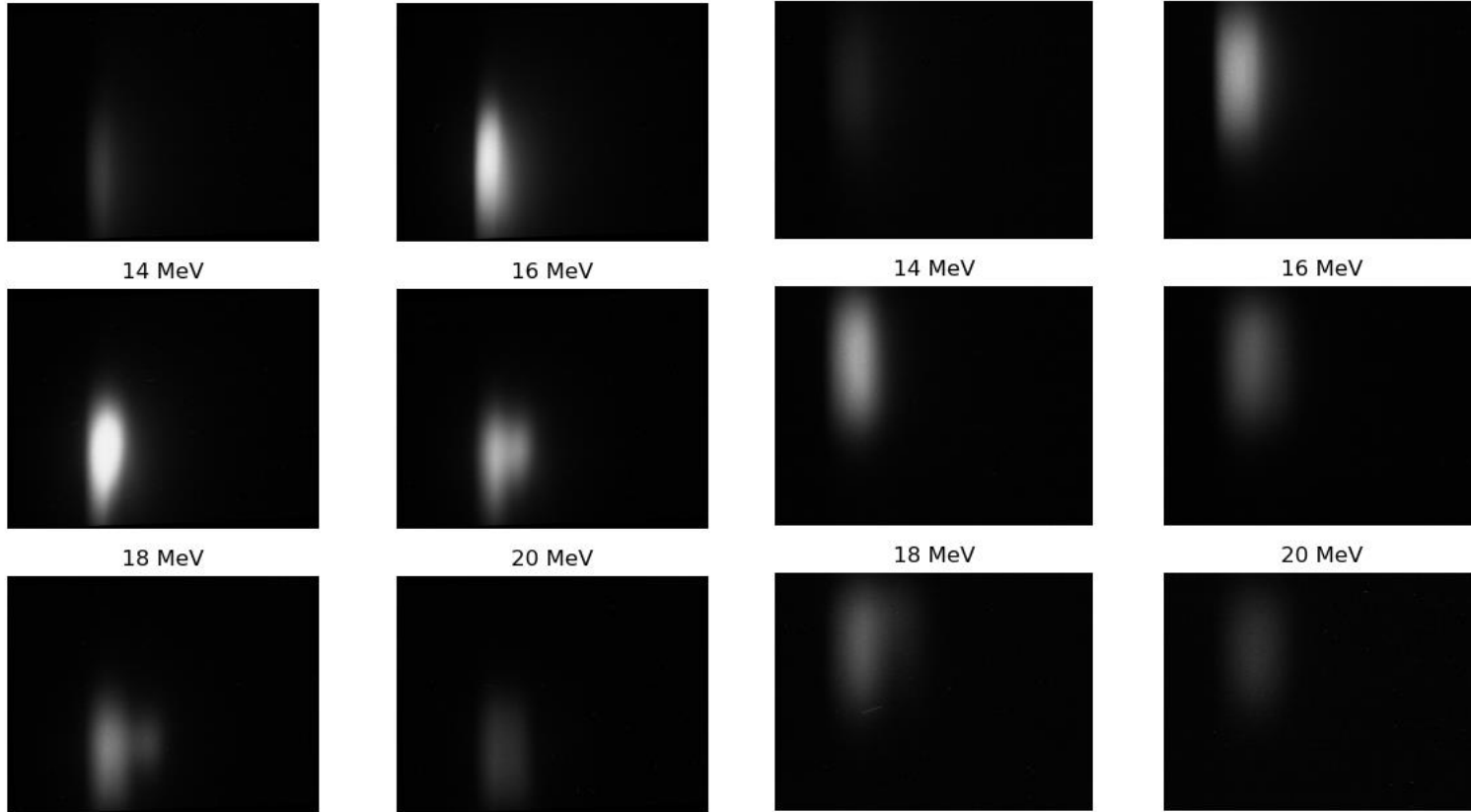
18 MeV

20 MeV

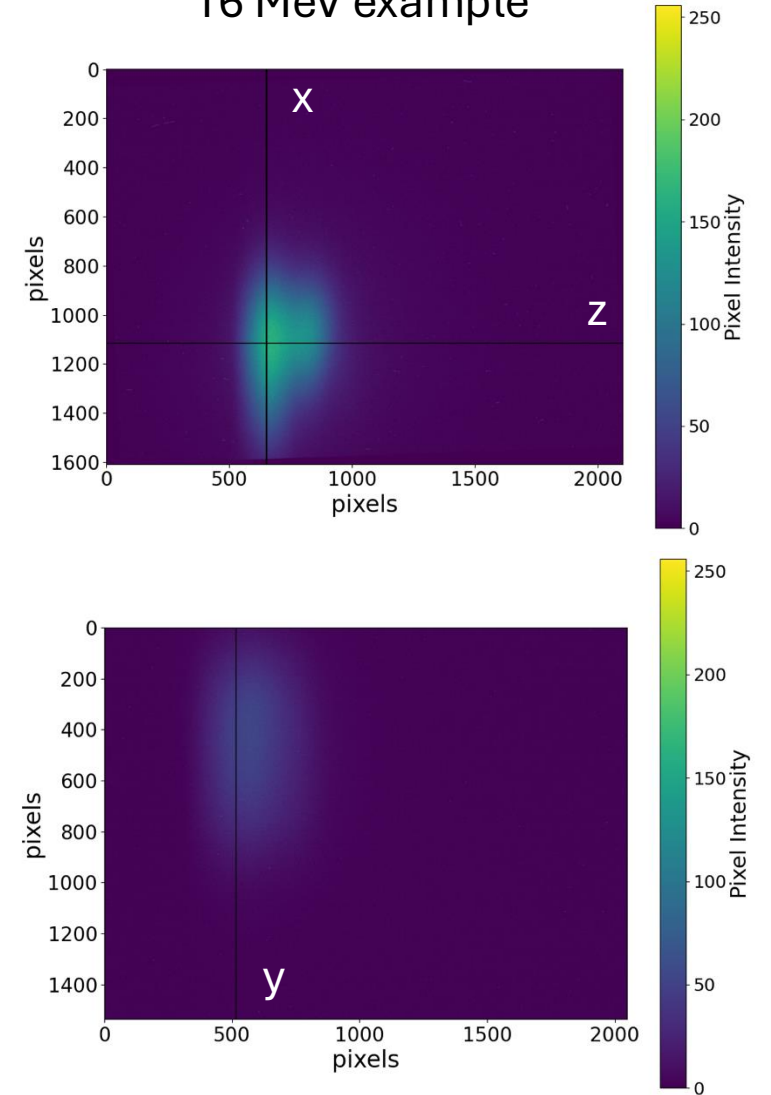
18 MeV

20 MeV

Beam
→

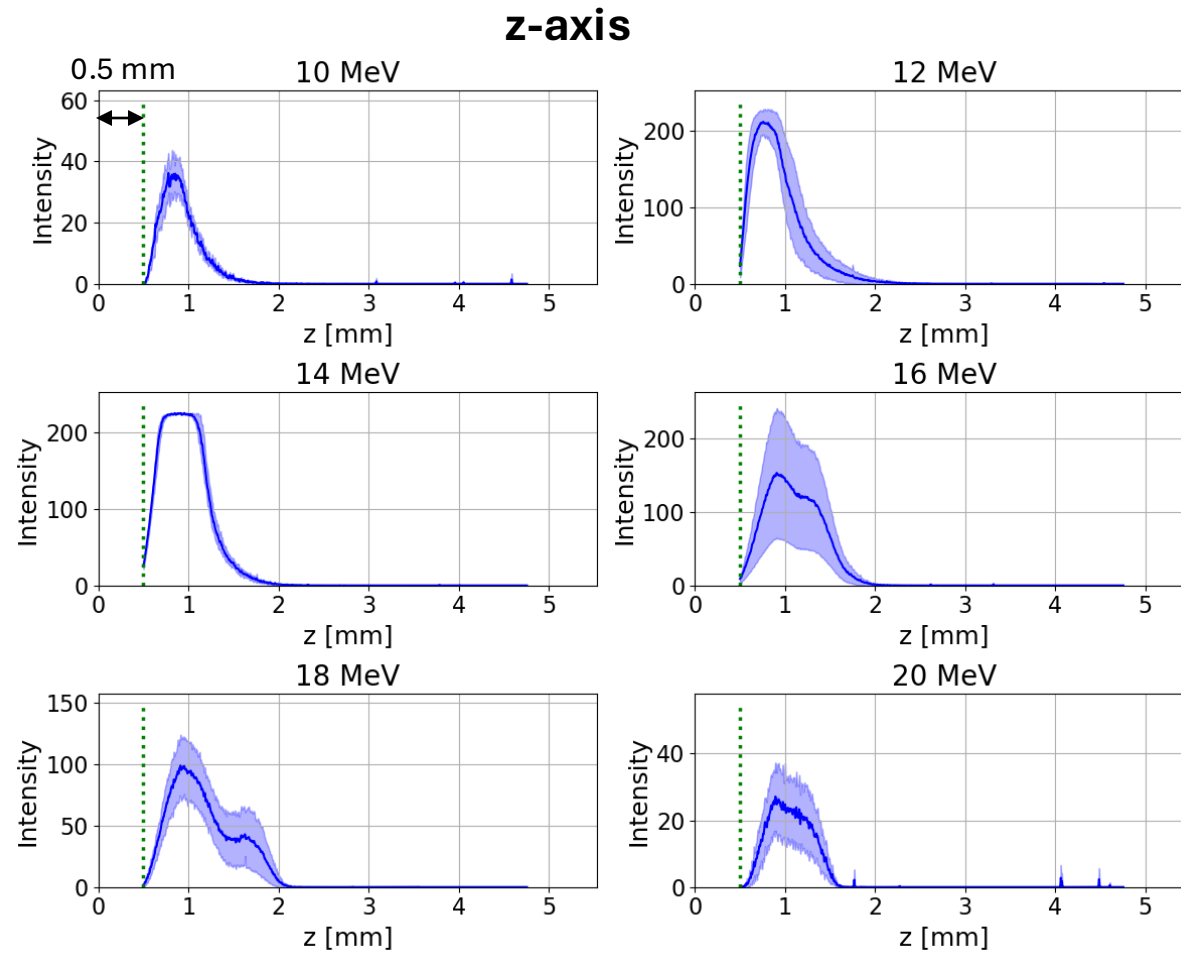


16 MeV example



Day 2 & 3: Liquid Scintillator

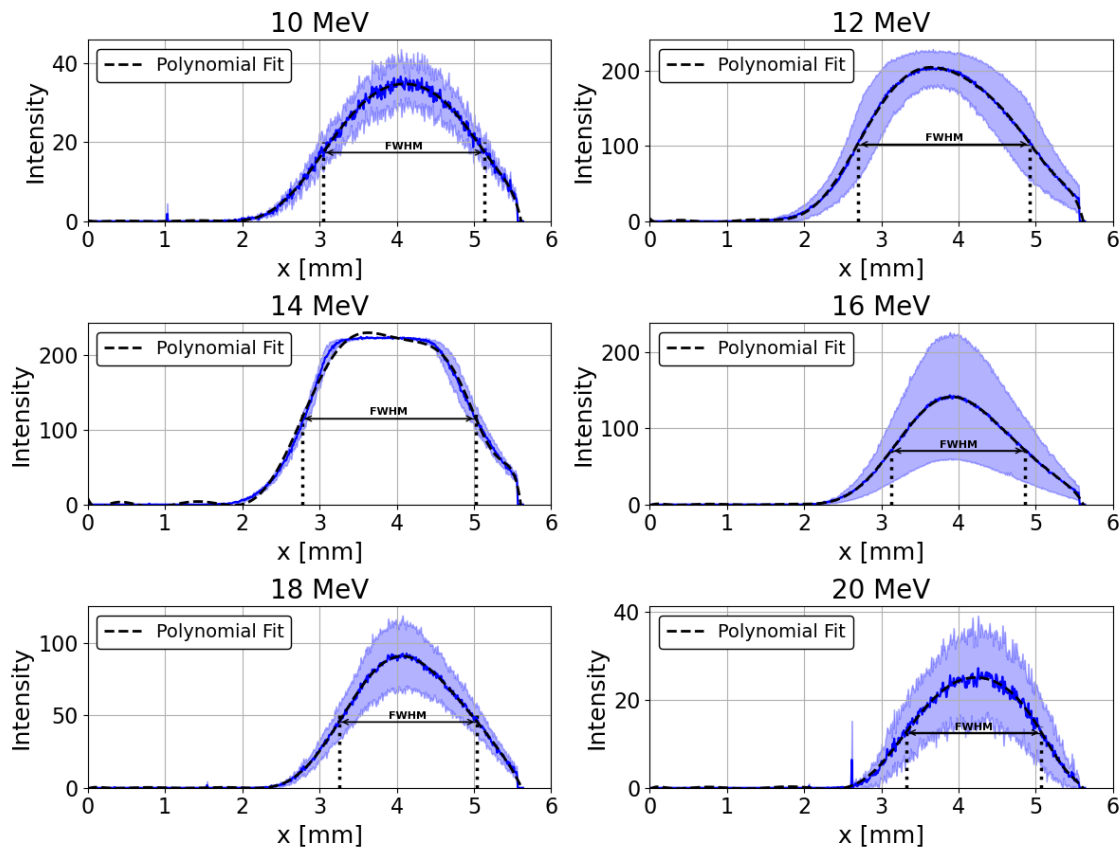
Energy Scan 4 mm Collimator



Average over 60 pixels

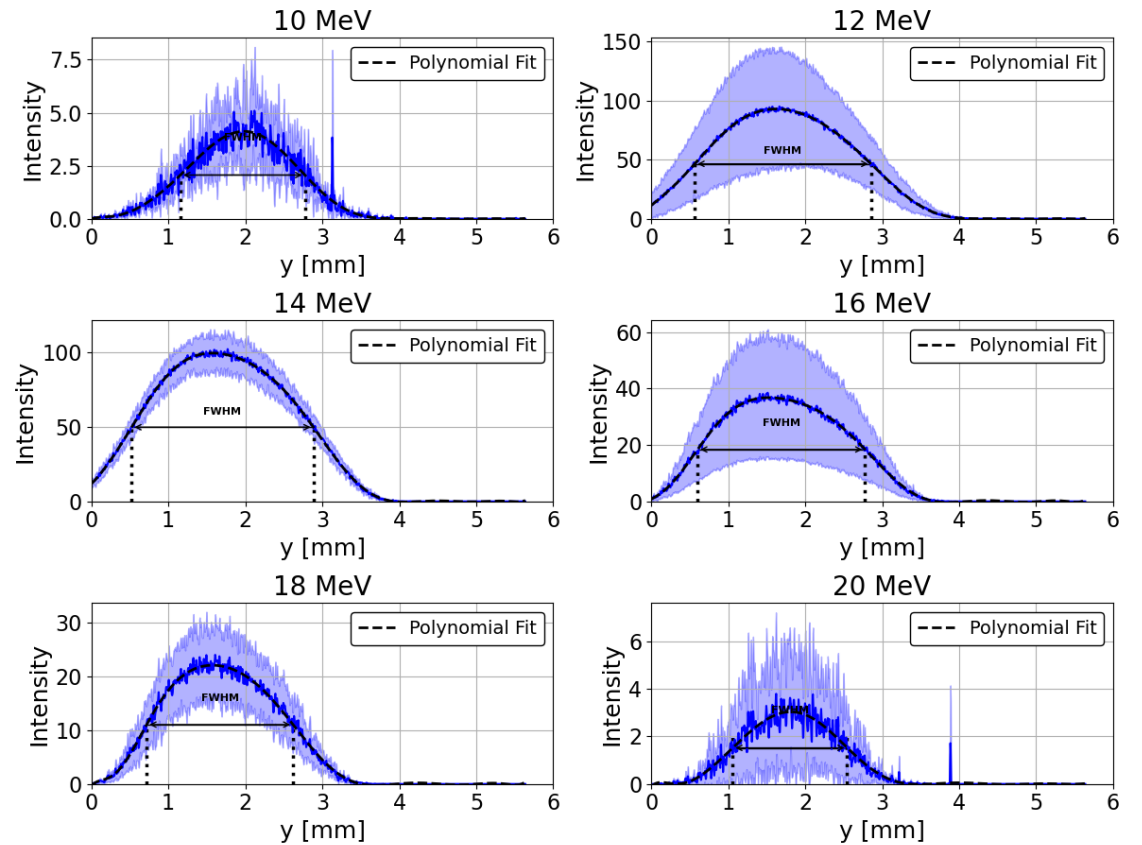
Day 2 & 3: Liquid Scintillator Energy Scan 4 mm Collimator

x-axis



Average over 60 pixels

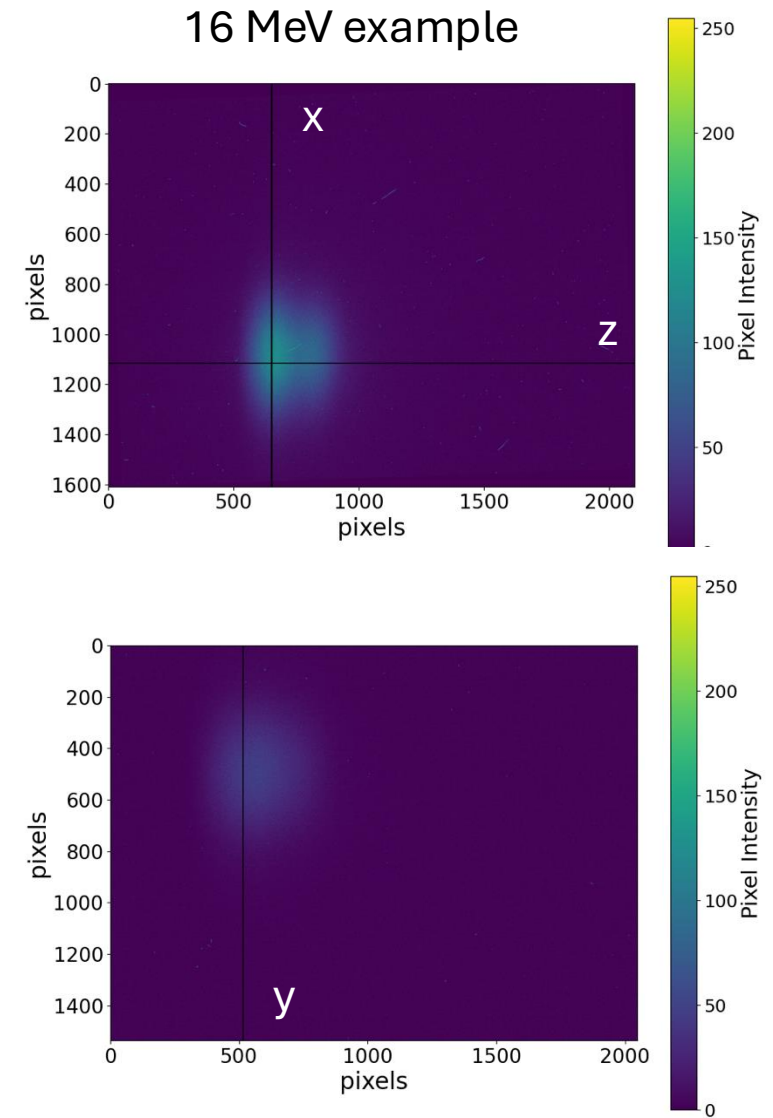
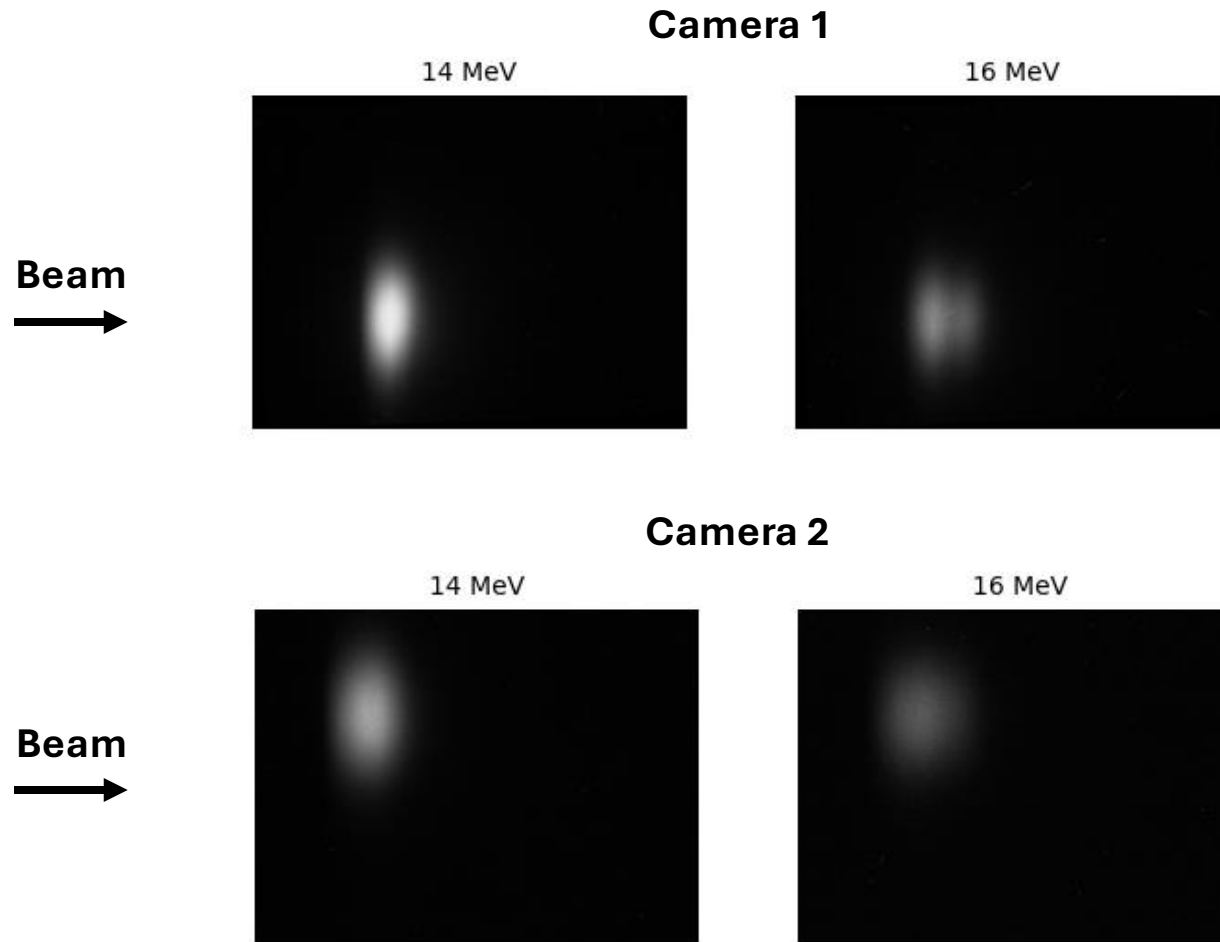
y-axis



Average over 60 pixels

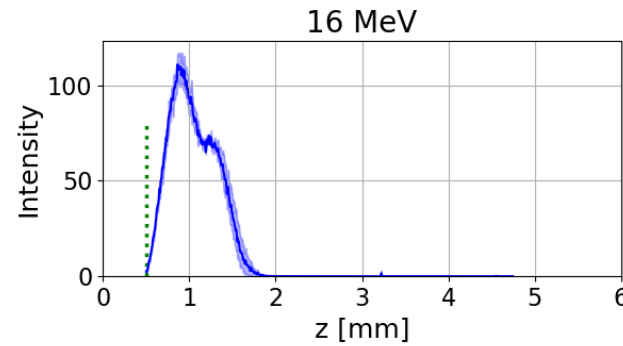
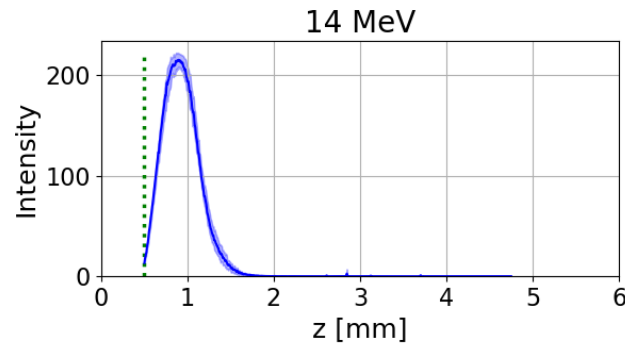
Day 2 & 3: Liquid Scintillator

Example image: 2 mm collimator



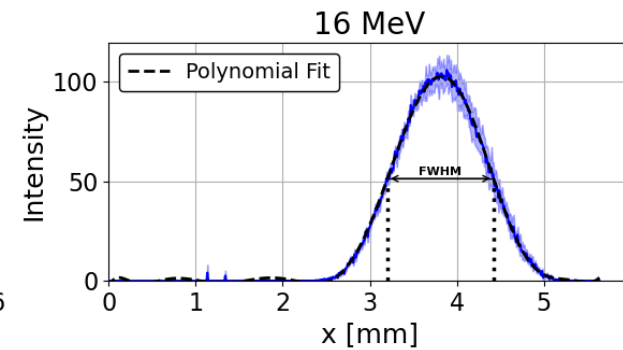
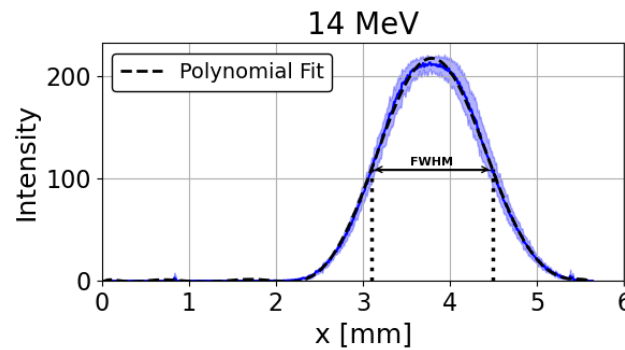
Day 2 & 3: Liquid Scintillator Energy Scan **2 mm Collimator**

z-axis



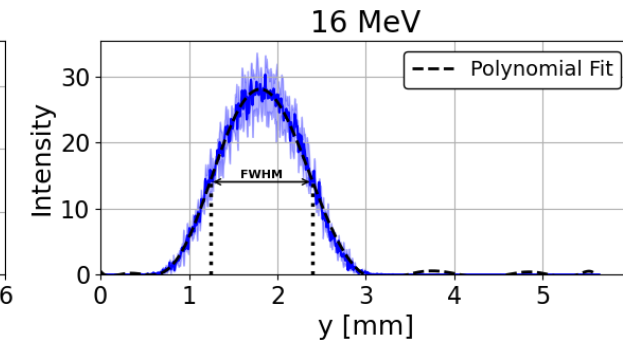
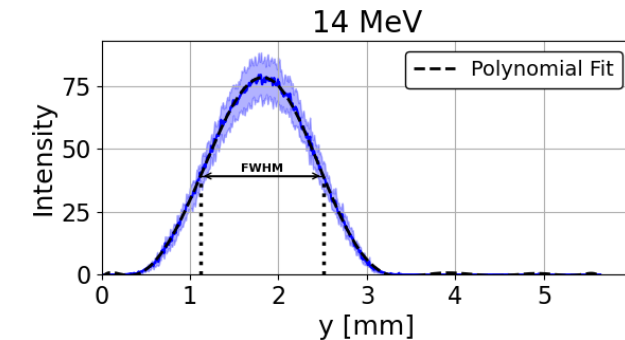
Average over 60 pixels

x-axis



Average over 60 pixels

y-axis

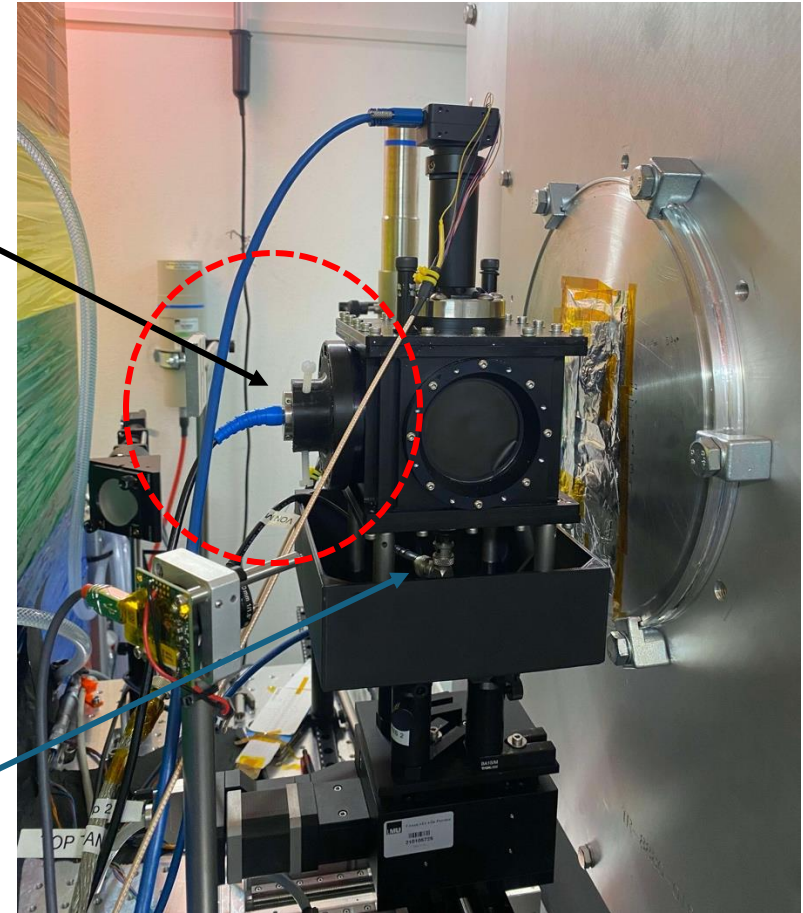


Average over 60 pixels

Day 2 & 3: Piston Hydrophone Data

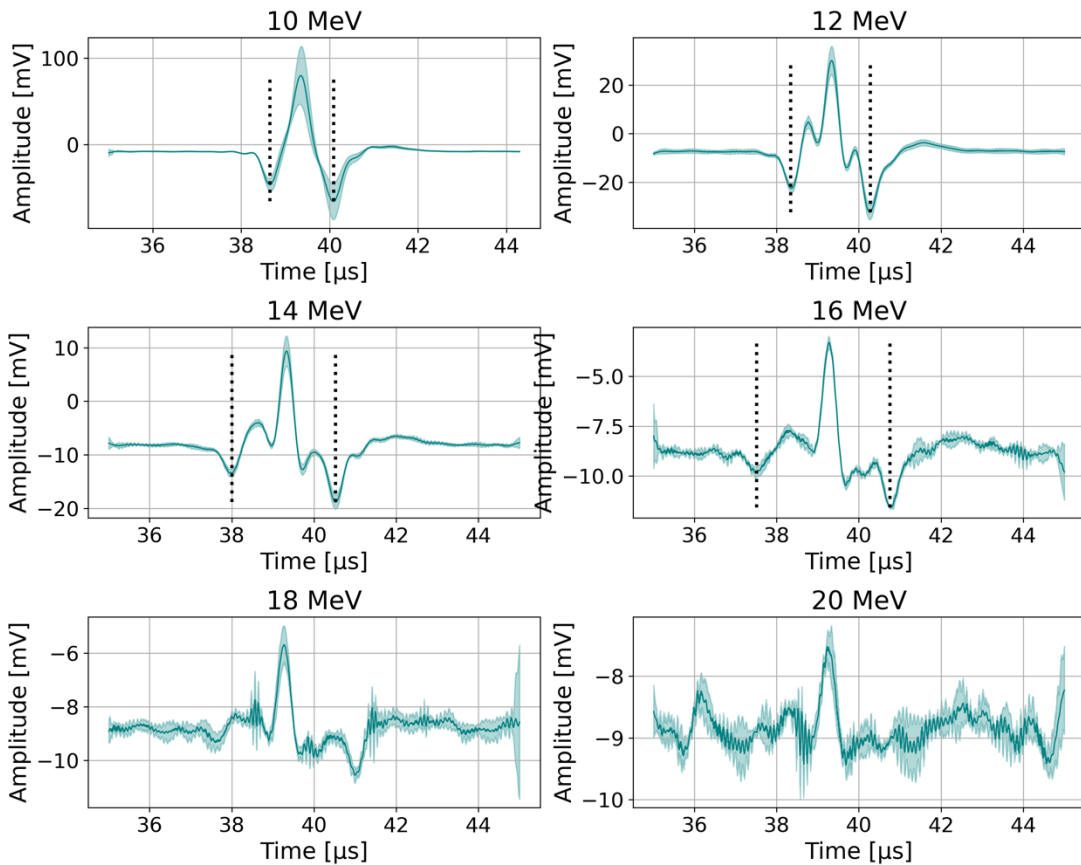
Piston hydrophone + voltage amplifier

Olympus hydrophone + charge amplifier

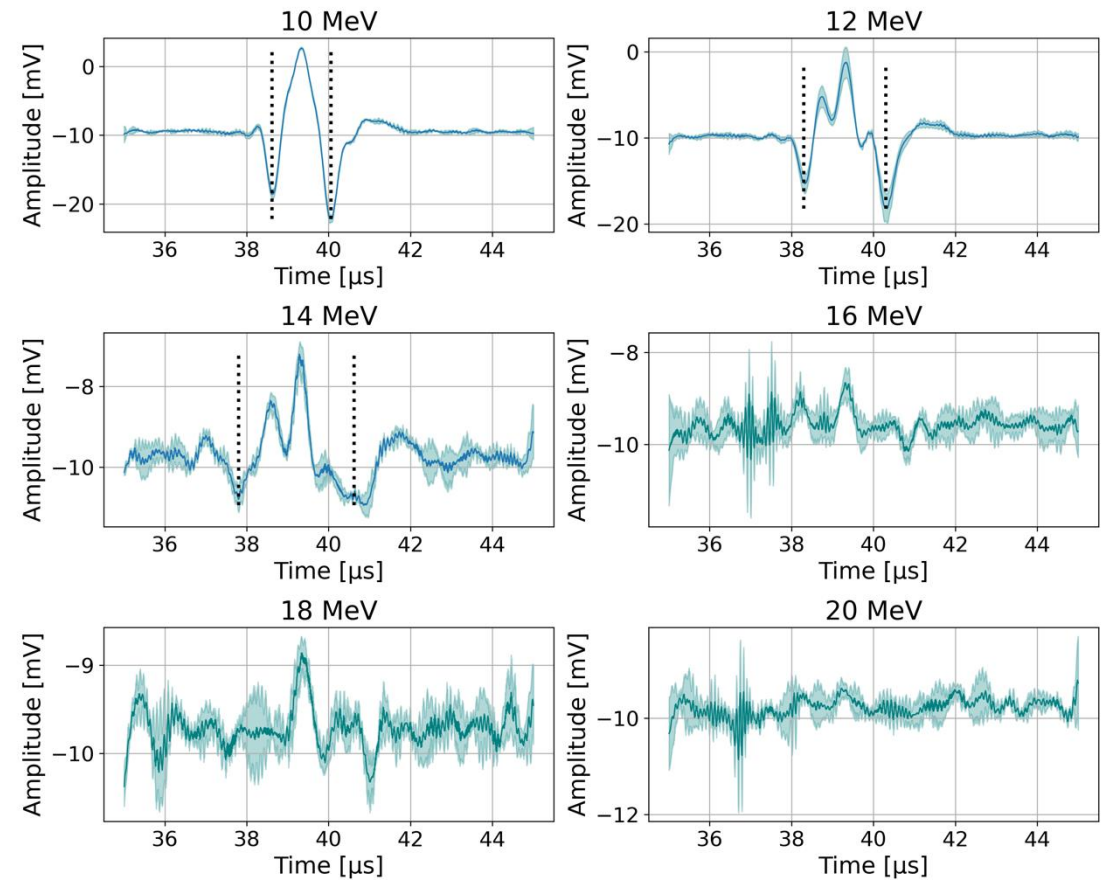


Day 2 & 3: Piston Hydrophone Energy Scan

No Collimator

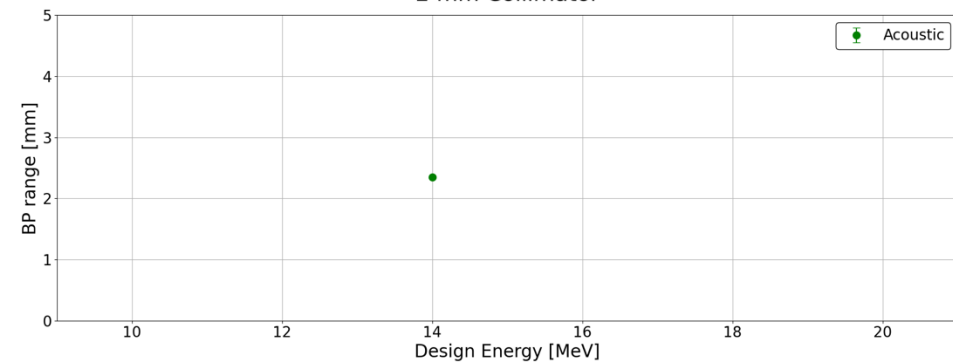
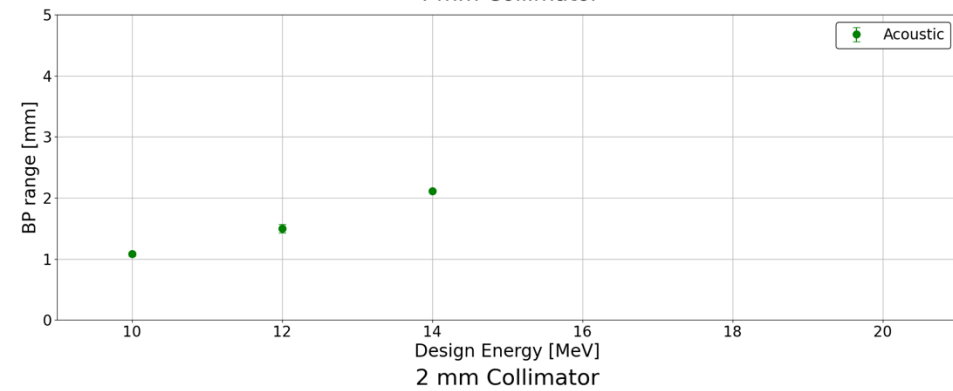
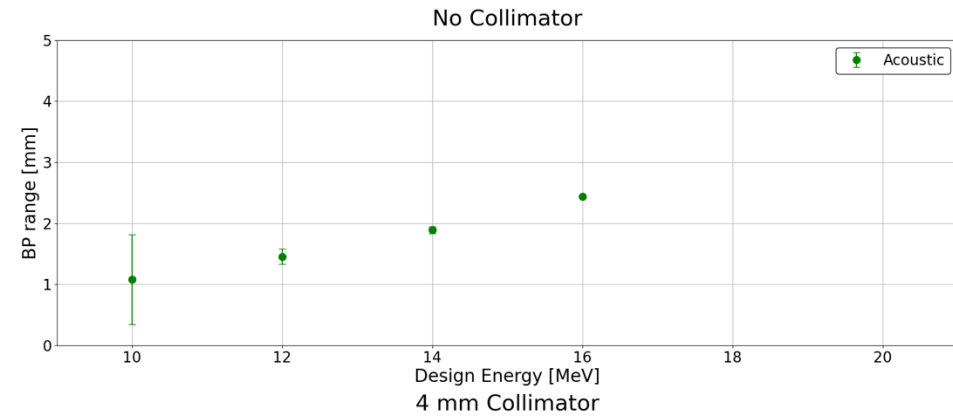
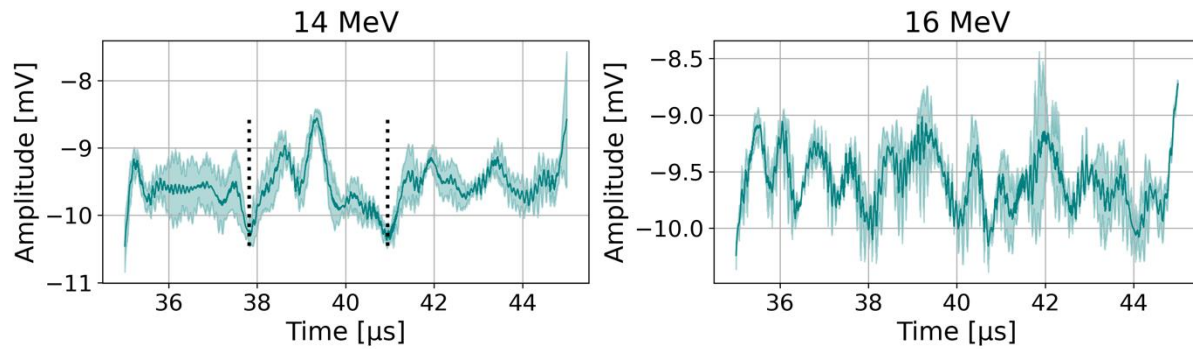


4 mm Collimator



Day 2 & 3: Piston Hydrophone Energy Scan

2 mm Collimator



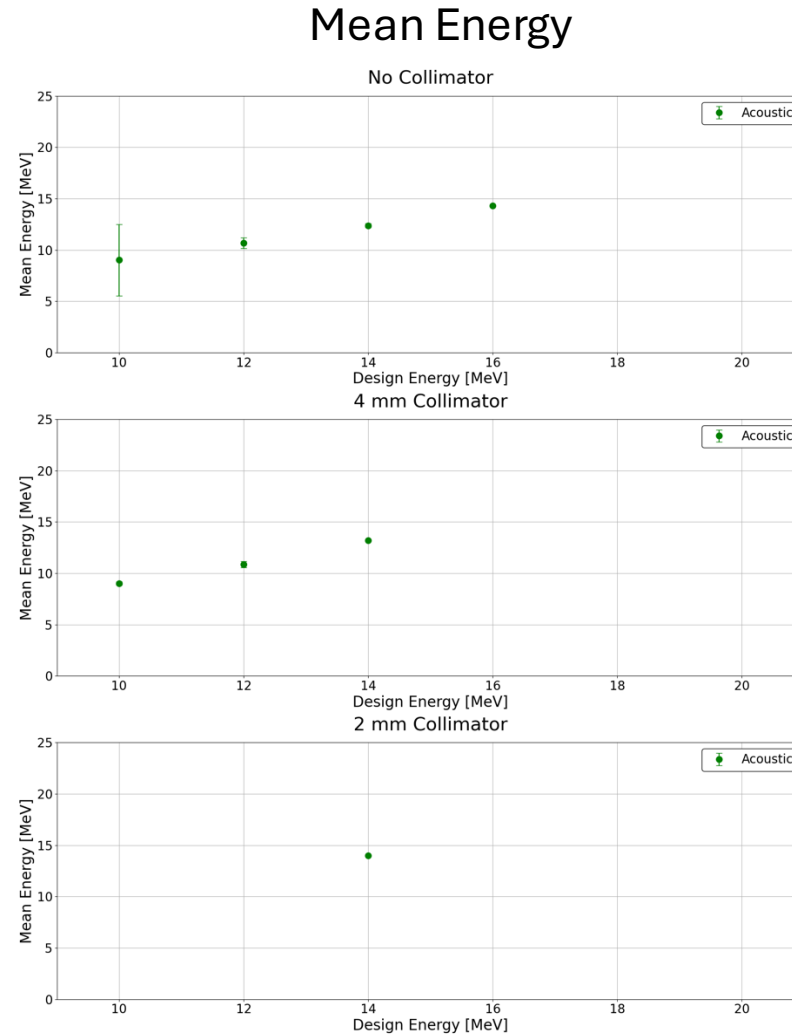
Day 2 & 3: Optical & Acoustic Comparison

Mean Energy

$$R = aE^p$$

$$a = 0.0022$$

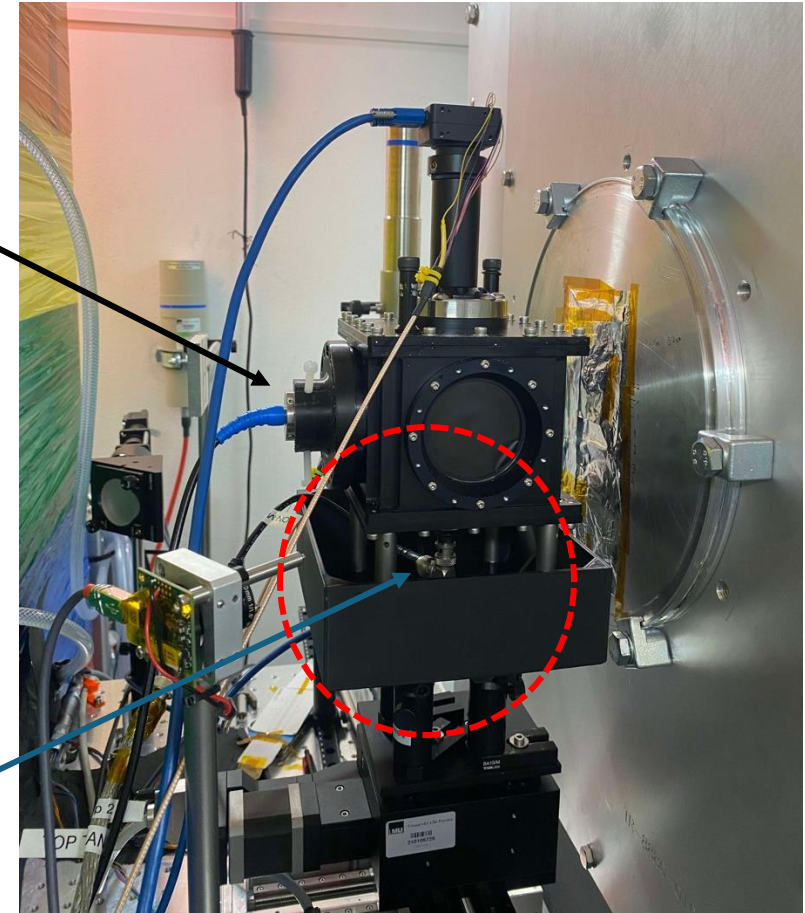
$$p = 1.77$$



Day 2 & 3: Olympus Hydrophone Data

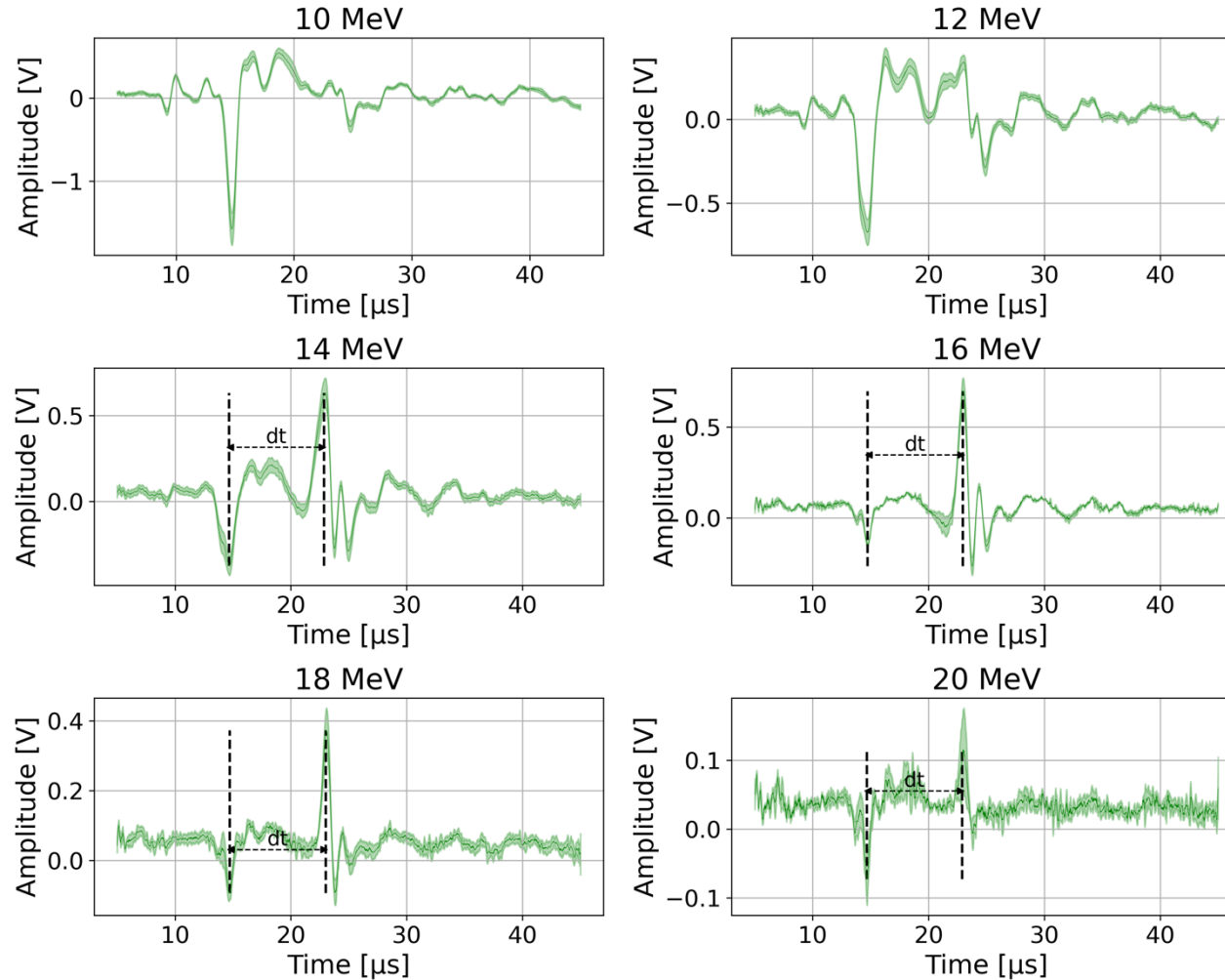
Piston hydrophone
+ voltage amplifier

Olympus hydrophone
+ charge amplifier



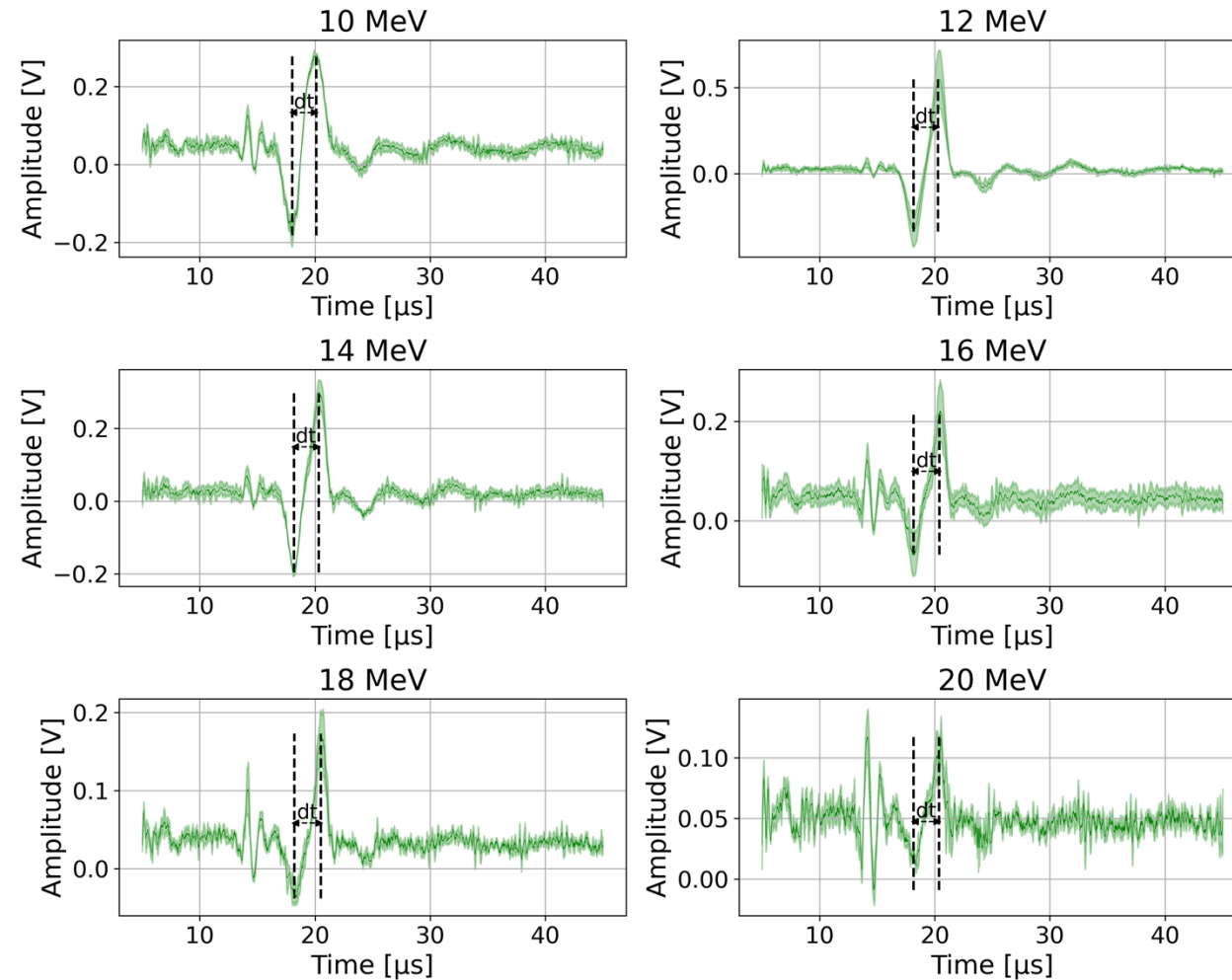
Day 2 & 3: Olympus Hydrophone

Energy Scan **No Collimator**



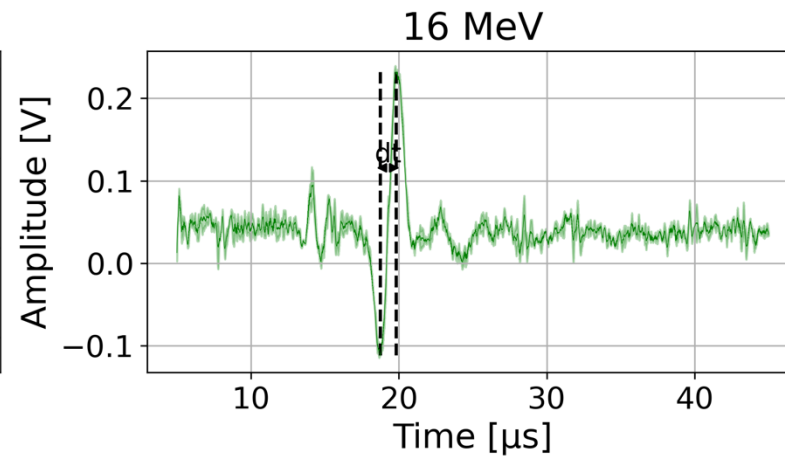
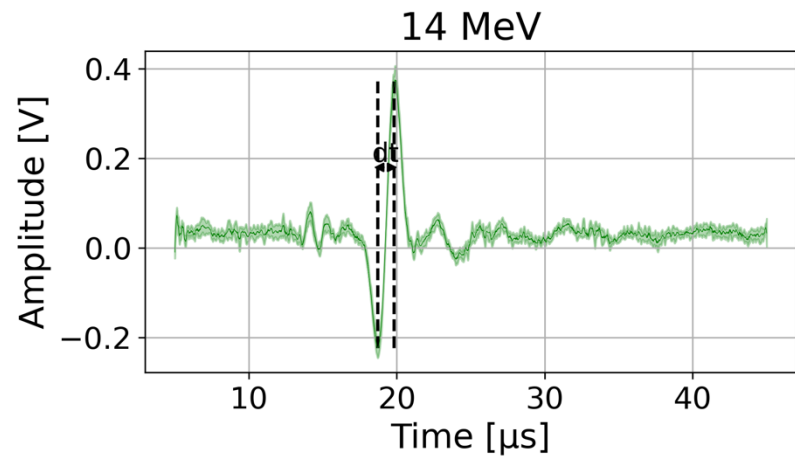
Day 2 & 3: Olympus Hydrophone

Energy Scan 4 mm Collimator



Day 2 & 3: Olympus Hydrophone

Energy Scan 2 mm Collimator



$$\text{FWHM}_y = dt \times v$$

Day 2 & 3: Optical & Acoustic Comparison FWHM

